



# NASA FBC TASK

INFO AGE →		
Old NASA	NASA In Transition	New NASA
80's	90's	New Millennium

## Technology Perspective for FBC

- NASA needs the will to lead, to be first in the world in creating revolutionary new SPACE TECHNOLOGY.
- FBC is here to stay. Some implementation changes are needed, but stay the course. Revolutionary advances in SPACE TECHNOLOGY are essential to NASA's future in FBC.
- At present, the agency's strategic SPACE TECHNOLOGY investment is small, overstated, and has no operational champion within the agency.
- At the critical cross-cutting and early innovation stages, support for NASA SPACE TECHNOLOGY development requires better planning and priority. There is minimal focus or coordination. The current approach has no provision for new technology initiatives.

**SPACE TECHNOLOGY development should be managed as a single body of work, led by a strong technology advocate, and have the organizational equivalency of Enterprise Missions.**



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## Information Technology Perspective for FBC

- First, we must solve the Enterprise/Center core competency issue before we can proceed to development of a more effected Integrated Technology Program-balancing Research and Advanced Development vs Focus Technology Development; balancing stable, Center of Excellence Technology Development vs Competitive Technology Development
- Again, a NASA HQ Leader must be assigned to develop this Integrated Technology Plan. This person could be the same leader in settling the Enterprise/Center core competency problem which must be solved first
- An important element of this Integrated Technology Plan is an Information Technology Program which integrates all related Information Technology thrusts into one Plan – IS, ISE, CoSMO. This IT Program must again be balanced between research and advanced development and focused technology developments
- **This Information Technology Team Program is the best HQ and Center-to-Center teaming arrangement to bring NASA into the INFO AGE as “one” NASA Center**



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NASA Information Technology Programs need an integrated direction. All of the Information Technology related thrusts- ISE, IS, IT, CoSMO - Must be folded into one Program with strong leadership that reports directly to the NASA Administrator

- This IT Program must have higher priority and sufficient funding
- ISE remains in a conceptual state. Level 1 Requirements are not mature. ISE Must:
  - ✓ Be more than a set of tools and components
  - ✓ Start with a vision linked to a set of system architectures that support Enterprise Missions
  - ✓ Be accepted into and supported by Enterprises
  - ✓ Be developed into a Program, integrated with IT/IS/CoSMO, which has:
    - A strong research and technology thrust keyed to uniform system architectures
    - A strong system engineering function
    - Clearly defined system architecture requirements which drive phased subsystem & integrated subsystem capabilities, tools, networks, etc. deliveries
    - A well-organized and motivated NASA, industry, university team
    - Working agreements/interfaces with Enterprises, other NASA codes, NASA Centers, science community, industry and academia
    - An integrated Program Schedule supporting the IT vision which forecasts phased, incremental, end-to-end performance demonstrations leading to major system architecture deliveries— constrained to available funding
    - Yearly reviews by a Review Group comprised of NASA, industry, university representatives

**IT will be the largest and most important NASA Center, industry, academia teaming initiative for the next decade**



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## IT Deliverables

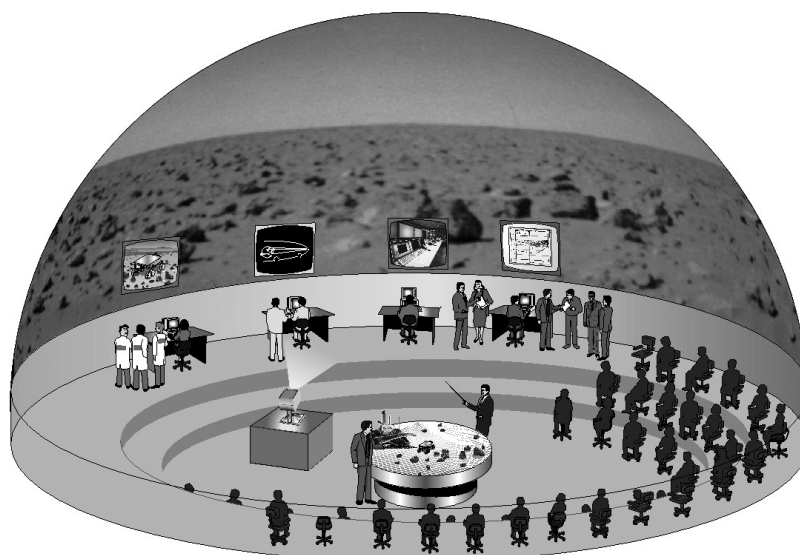
- The IT Program must be comprised of both basic research and near-term developments of infrastructure driven by Enterprise mission architectures
- Basic research, aimed at breakthroughs, is thoroughly planned, prioritized, and subject to continual peer review scrutiny as to relevancy, need for redirection, etc. They work to a schedule too!
- For the near-term, 3-5 years, it is a shame that no schedule exists for delivery of important IT incremental deliveries leading to major Mission architectural deliveries utilizing currently available and maturing technology at both ends of the Mission Sequence – at the front end in visualizing the design and simulation flight operations before Project Start, and in the final stages, in flight operations, in graphic visualization of the distant encounter site.



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## MARS OPERATIONS/PUBLIC VIEWING DOME



**An example of an Information Technology Delivery Target**



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## NASA Center Teaming

- As we proceed into Info Age, NASA Enterprises and NASA Centers will become less and less stand-alone entities. Their individual lines of distinction will become more and more blurred as electronic networks of co-operative work between them advance to make all of NASA effectively one Center- comprised of "Specialty Centers" which combine to make the total products. And this will expand to encompass both industry and universities as well – one NASA – Industry – University Center

- The same is happening with the commercial sector throughout the world:

**Networks of companies, each with its "core competency" compete worldwide against other networks of companies in a "One World"**

- All "stovepipes", "fiefdoms", and "castles" will come tumbling down. In addition to electronic networking, mobilization, movement of key personnel from one Center to another-including HQ, is important to this dynamic transition
- A HQ Leader with clout must be assigned to facilitate this dynamic transition, especially in settling on the roles and core competencies of each Center relative to the Enterprises at HQ
- Yearly performance evaluations must include how well all Enterprises and Centers are doing in affecting this teaming transition. Facility decisions, for example, must be made from a NASA view as opposed to a Center view

- All of NASA must stop thinking in terms of individual entities but instead of themselves as important parts which contribute to the whole picture**



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- Currently, Center teaming exists in established roles where historically there's a clear advantage for each center. Also, some new Center teaming initiatives are working which don't need fixing

**But in general, Centers are stand-alone and protective, especially in transitioning to new roles which are not so clearly defined or accepted in the NASA Community**

- Downsizing, competition, threat of closure, longstanding feuds are obstacles
  - ✓ Center core competency and lead Center roles need work before we can proceed further
  - ✓ Research Centers need clearly defined and accepted roles and stability
- Incentives, clear objectives and payoff must be established for Center teaming
  - ✓ Must start at HQ, in particular with the Enterprises
  - ✓ Team only when there is a major advantage
  - ✓ Remove adversarial, and formal barriers to effective teaming
  - ✓ Mobilize the NASA Workforce to breakdown HQ and Center barriers

## **Most important HQ/Center-to-Center Teaming Trust: Information Technology (IT)**

- ✓ Currently, there are somewhat independent pockets of IT and associated re-engineering work ongoing inside Centers and among the Centers
- ✓ There is much uncertainty as to core competency roles—clarify and facilitate
- ✓ ISE, IT, IS, CoSMO and related engineering/management initiatives, must be integrated into a united Research, Development, Implementation Plan
- NASA must become a worldwide leader in IT

IT = Information Technology  
IS = Intelligent Systems

HQ = Headquarters  
ISE = Intelligent Synthesis Environment

CoSMO = Linking of NASA Center "Super Computers"

AJS  
March 2000  
18b



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## Industry Perspective for FBC

- The Industry Workshop represented a broad section of the aerospace community:
  - ✓ Senior professionals from industry and academia including PI's
  - ✓ An unconstrained and open discussion
- Industry and academia fully support the strategy behind NASA's "Faster, Better, Cheaper" initiatives
- However, the pendulum has swung too far
- Programs budgets are too lean and design teams are moving too fast
- The most important element of the strategy is better – the best we can do with available funds
- Success depends upon a strong industrial and academic base
- The future is bright for a steady pace towards less expensive more reliable, and higher performance spacecraft





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## Industry Perspective for FBC *continued...*

- “Only do what industry can’t do”:
  - ✓ Drive this awareness down throughout the institution.
- Establish firm objectives for all programs in terms of how FBC practices are to be applied
- Subject NASA to the review process:
  - ✓ More external independent assessments to ensure scope and balance of NASA’s programs
  - ✓ Renew and strengthen internal program review practices
    - Improve quality of “Independent Cost Reviews”
- Expand adequacy and stability of technology program budgets
  - Re-prioritize funds as necessary
  - ✓ Close the gap between flight projects and technology projects
  - ✓ Help industry mitigate risks



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## Industry Perspective for FBC *continued...*

- Review agency policies regarding data buys:
  - ✓ Unless exceptional conditions can be proven, *ALL* Earth remote sensing programs should be structured as data buys
  - ✓ Explore the concept of commercial planetary remote sensing missions
  - ✓ Examine potential opportunities within existing series (Discovery, SMEX...) for data buys
- Maintain a commitment to science and technology programs aimed at American universities:
  - ✓ Steady pace of small experiments with assured launch
  - ✓ Restore university involvement
  - ✓ Step up funding of grants aimed at advanced technology
- Be a serious enabler of low-cost and reliable access to space.
- Fight for initiatives that allow the NASA to retain a staff of smart-buyers.